June 1961

TO THE GRADUATE COUNCIL:

I am submitting herewith a problem written by Felix Eugene Knight entitled "Commercial Supplement Versus a Home-Mixed Supplement Plus Corn Free Choice for Finishing Swine". I recommend that it be accepted for three quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science with a major in Animal Husbandry.

Charles S. Hobbs
Major Professor

We have read this problem and
recommend its acceptance.

Lewis M. Dickson
Horace C. Smith Jr.
Spencer D. Griffin
Harold J. Smith
Luther H. Keller

# COMMERCIAL SUPPLEMENT VERSUS A HOME-MIXED SUPPLEMENT PLUS CORN FREE CHOICE FOR FINISHING SWINE

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A PROBLEM

Submitted to
The Graduate Council
of
The University of Tennessee
in
Partial Fulfillment of the Requirements
for the degree of
Master of Science

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by

Felix Eugene Knight

June 1961

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# CHAPTER I

## INTRODUCTION

In Tennessee there are approximately 1,182,000 hogs reported on farms, valued at $33,214,000. In Rutherford County, there are approximately 22,500 swine reported on farms valued at $600,000.

Swine suffer from nutritient deficiencies much more frequently than cattle or sheep, chiefly because they cannot utilize large amounts of roughages. They grow much more rapidly than do cattle or sheep and the B-complex vitamins are synthesized in their digestive tracts to a much less extent than in the four-fold stomach of ruminants.

Swine production in Middle Tennessee is becoming more important with nine counties selling pigs through feeder pig associations. With the increased emphasis being placed on swine in Middle Tennessee, it was felt some work needed to be done to determine if farmers could make more economical gains from swine. The purpose of the work was to determine if it would be more economical for farmers to have their own supplements mixed or buy commercial supplements. The effects on average daily gain, feed efficiency, and back fat probe were observed.

## CHAPTER II

## PROCEDURE

Forty-six pigs were allotted to two pens of twenty-three pigs each on the basis of their weight and sex. There were ten gilts and thirteen barrows with an initial weight of 1,109 pounds fed commercial supplement and nine gilts and fourteen barrows with an initial weight of 1,107 pounds fed a home-mixed supplement. The individual pig weights ranged from twenty-seven pounds to seventy-six pounds. The pigs were fed in ten feet by thirty feet concrete floored pens. One group was fed a commercial supplement plus corn free choice, and the other group was fed a home-mixed supplement plus corn free choice. The analysis given on the feed tag of the commercial supplement is presented in Table I. The formula for the home-mixed supplement was taken from the University of Tennessee Publication 391, More Money From Hogs. The formula for the home-mixed supplement is presented in Table II. The first mixture of this supplement was fed at the beginning of the feeding period, and the second mixture was then fed until the hogs were marketed.

The criteria used in evaluating the supplements were daily gain, feed consumption, feed efficiency, cost per pound of gain, and back fat probe. The hogs were fed 110 days and weighed with the same scales with which they were weighed at the beginning of the experiment. Three probes were taken on each hog. The three probes were taken two inches from the center of the back at the first rib, last rib, and the last lumbar. An average of the three probes was made and then adjusted on a 200-pound

basis. These adjustments were made according to the table presented in the University of Tennessee Special Circular 498, Probe For Profit.

TABLE I

COMMERCIAL SUPPLEMENT

| Ingredients | Per cent |
|---|---|
| Crude Protein, not less than | 40.00 |
| Crude Fat, not less than | 1.50 |
| Crude Fiber, not MORE than | 10.00 |
| Calcium (Ca), not less than | 2.70 |
| Calcium (Ca), not MORE than | 3.20 |
| Phosphorus (P), not less than | 0.70 |
| Iodine (I), not less than | .0001 |
| Salt (NaCl), not less than | 1.50 |
| Salt (NaCl), not MORE than | 1.75 |

INGREDIENTS: Soybean oil meal, dehydrated alfalfa meal, meat and bone scraps, wheat standard middlings, feeding cane molasses, vitamin $B_{12}$ and antibiotic feed supplement, vitamin $D_2$ supplement, choline chloride, niacine, riboflavin, calcium pantothenate, calcium carbonate 3.0%, defluorinated phosphate 1.0%, salt 2.5%, ferrous carbonate 0.018%, manganous oxide 0.012%, magnesium oxide 0.007%, zinc oxide 0.007%, copper oxide 0.007%, cobalt carbonate 0.001%, potassium iodide 0.007%.

TABLE II

HOME-MIXED SUPPLEMENT*

| Ingredients | First Mixture (Pounds) | Second Mixture (Pounds) |
|---|---|---|
| Soybean oil meal (41%) | 500 | 1,100 |
| Meat and Bone Meal (50%) | 250 | 400 |
| Alfalfa meal (15%) | 150 | 300 |
| Mineral mixture** | 20 | 40 |
| Vitamins and antibiotics*** | 10 | 20 |
| TOTALS | 930 | 1,860 |

*The analysis of this supplement is as follows: crude protein not less than 37.00%; crude fat not less than 1.50%; and crude fiber not more than 10.00%.

**The guaranteed analysis of the mineral mixture is as follows: calcium not more than 35.0% and not less than 30.0%; phosphorous not less than 5.0%; salt not more than 10.0%; and iodine not less than 0.038%.

***The guaranteed analysis of the vitamin and antibiotic mixture is as follows: vitamin A not less than 100,000 USP units per pound; vitamin $D_2$ not less than 100,000 USP units per pound; vitamin E not less than 100 IU per pound; riboflavin not less than 300 mg. per pound; pantothenic acid not less than 800 mg. per pound; niacin not less than 2,000 mg. per pound; choline not less than 10,000 mg. per pound; vitamin $B_{12}$ activity not less than 1.0 mg. per pound; procaine penicillin not less than 0.4 gm. per pound; bacitracin not less than 0.6 gm. per pound; crude protein not less than 18%; crude fat not less than 2%; crude fiber not more than 20%; and ash not more than 20%.

# CHAPTER III

## RESULTS

The results are summarized in Table III.

Average Daily Gain. There was no difference in average daily gains for the two groups. Both groups had an average daily gain of 1.5 pounds per day. Variance of average daily gains and feed efficiency could not be analyzed since the pigs were only weighed at the beginning and end of the experiment.

Feed Efficiency. The group receiving the commercial supplement ate 1.38 pounds of supplement and 4.50 pounds of corn per pig daily, and the group receiving the home-mixed supplement ate .98 pounds of supplement and 4.40 pounds of corn per pig daily. The main difference was the consumption of .4 of a pound more of the commercial supplement per pig daily which resulted in a higher cost per 100 pounds gain for pigs fed commercial supplement. Feed cost per 100 pounds gain was $12.68 for the group fed commercial supplement and $10.92 for the group fed home-mixed supplement, or a difference of $1.76 in cost per 100 pounds gain.

Back Fat Probe. The group receiving the commercial supplement had an average back fat probe of 1.43 inches, and the group receiving the home-mixed supplement had a back fat probe of 1.35 inches. This was a difference of .08 inches, or 5.6 per cent. (See Tables IV and V.)

The group fed the commercial supplement, costing $4.95 per 100 pounds, made a profit of $9.45; whereas, the group fed the home-mixed supplement, costing $4.82 per 100 pounds, made a profit of $55.12. The commercial supplement cost 13 cents per 100 pounds more than the home-made supplement. The antibiotics and minerals would have probably cost less had they been purchased in larger quantities, thus resulting in an even lower cost for the home-mixed supplement. The main difference in the profit of the two groups in this experiment was the increased consumption of the commercial supplement.

Trouble was encountered with both groups as a result of tail biting. Two pigs were removed from the experiment due to tail biting, and one pig died at the beginning of the feeding period from an unknown cause. Adjustments were made on the weight and feed consumption of each of these pigs in order that there would be no apparent effect on this experiment.

TABLE III

PERFORMANCE OF PIGS FED COMMERCIAL SUPPLEMENT

AND HOME-MIXED SUPPLEMENT

| | Commercial Supplement | Home-mixed Supplement |
|---|---|---|
| No. Pigs | 23 | 20* |
| Starting Weight (lb.) | 1,109 | 930** |
| Final Weight (lb.) | 5,075 | 4,403 |
| Total Gain (lbs.) | 3,966 | 3,473 |
| Average Daily Gain Per Pig (lbs.) | 1.56 | 1.57 |
| Supplement Per Pig (lbs.) | 152.2 | 108.5 |
| Corn Per Pig (lbs.) | 504.4 | 490.0 |
| Total Feed Per Pig (lbs.) | 656.6 | 598.5 |
| Feed Per Lbs. Gain | 3.80 | 3.45 |
| Cost Per 100 Lbs. Gain | $12.68 | $10.92 |
| Average Back Fat Probe (Adjusted 200 lbs.) | 1.43 | 1.35 |

*There were only 20 pigs in this group that remained in the experiment the full feeding period. (See page 7 for explanation.)

**The weights of the three pigs that had to be taken out of the experiment were subtracted from the beginning weight of 1,107 pounds.

# CHAPTER IV

## SUMMARY

Forty-three pigs were allotted to two treatment groups and fed from an average weight of 48 pounds to an average weight of 220 pounds in concrete pens. One group received a commercial supplement and the other group received a home-mixed supplement. There was no difference in the average daily gain between the two groups. However, there was a difference of 58 pounds of feed per 100 pounds of gain and a difference of $1.76 in cost per 100 pounds gain. This was due primarily to the increased consumption of the commercial supplement. The increased consumption of the commercial supplement was probably due to palatability. There was no apparent difference in back fat thickness in the two groups. The pigs were not identified; therefore, individual performance records could not be kept.

These results indicate it is economically feasible for farmers to use home-mixed supplements.

TABLE IV

INDIVIDUAL BACK FAT PROBES OF GROUP FED COMMERCIAL SUPPLEMENT

| Pig No. | Weight | First Rib | Last Rib | Last Lumbar | Average | Adjusted 200 Lbs. |
|---|---|---|---|---|---|---|
| 1 | 174 | 1.5 | 1.4 | 1.2 | 1.4 | 1.60 |
| 2 | 172 | 1.2 | 1.1 | 1.3 | 1.2 | 1.40 |
| 3 | 190 | 1.4 | 1.3 | 1.6 | 1.4 | 1.50 |
| 4 | 210 | 2.0 | 1.7 | 1.6 | 1.8 | 1.70 |
| 5 | 266 | 1.9 | 1.5 | 1.8 | 1.7 | 1.30 |
| 6 | 184 | 1.5 | 1.2 | 1.4 | 1.4 | 1.50 |
| 7 | 192 | 1.5 | 1.1 | 1.2 | 1.3 | 1.35 |
| 8 | 224 | 1.7 | 1.7 | 1.6 | 1.7 | 1.50 |
| 9 | 230 | 2.0 | 1.7 | 1.5 | 1.7 | 1.30 |
| 10 | 240 | 1.7 | 1.5 | 1.4 | 1.5 | 1.25 |
| 11 | 224 | 1.7 | 1.3 | 1.3 | 1.4 | 1.25 |
| 12 | 230 | 1.9 | 1.5 | 1.5 | 1.6 | 1.40 |
| 13 | 250 | 1.8 | 1.4 | 1.5 | 1.6 | 1.30 |
| 14 | 220 | 1.9 | 1.5 | 1.5 | 1.6 | 1.45 |
| 15 | 216 | 1.8 | 1.4 | 1.5 | 1.6 | 1.50 |
| 16 | 220 | 1.5 | 1.5 | 1.7 | 1.6 | 1.45 |
| 17 | 246 | 1.9 | 1.7 | 1.7 | 1.8 | 1.45 |
| 18 | 220 | 1.6 | 1.5 | 1.4 | 1.5 | 1.35 |
| 19 | 252 | 2.0 | 1.6 | 1.7 | 1.8 | 1.45 |
| 20 | 230 | 2.1 | 1.8 | 2.0 | 2.0 | 1.75 |
| 21 | 227 | 1.9 | 1.7 | 1.9 | 1.8 | 1.60 |
| 22 | 206 | 1.4 | 1.4 | 1.5 | 1.4 | 1.35 |
| 23 | 252 | 2.0 | 1.5 | 1.6 | 1.7 | 1.35 |
| AVERAGES | 220.6 | | | | 1.6 | 1.43 |

TABLE V

INDIVIDUAL BACK FAT PROBES OF GROUP FED HOME-MIXED SUPPLEMENT

| Pig No. | Weight | First Rib | Last Rib | Last Lumbar | Average | Adjusted 200 Lbs. |
|---|---|---|---|---|---|---|
| 1 | 213 | 1.4 | 1.4 | 1.0 | 1.3 | 1.25 |
| 2 | 190 | 1.3 | 1.1 | 1.2 | 1.2 | 1.25 |
| 3 | 206 | 2.0 | 1.4 | 1.3 | 1.6 | 1.55 |
| 4 | 230 | 2.2 | 1.3 | 1.6 | 1.7 | 1.5 |
| 5 | 254 | 1.4 | 1.3 | 1.2 | 1.3 | 1.0 |
| 6 | 240 | 2.2 | 1.6 | 1.7 | 1.8 | 1.5 |
| 7 | 214 | 1.2 | 1.1 | 1.3 | 1.2 | 1.1 |
| 8 | 256 | 2.0 | 1.8 | 1.7 | 1.8 | 1.4 |
| 9 | 210 | 1.1 | 1.0 | 1.2 | 1.1 | 1.0 |
| 10 | 220 | 1.7 | 1.2 | 1.2 | 1.4 | 1.25 |
| 11 | 166 | 1.4 | .9 | 1.0 | 1.1 | 1.35 |
| 12 | 240 | 1.7 | 1.4 | 1.4 | 1.5 | 1.25 |
| 13 | 210 | 1.5 | .9 | 1.1 | 1.2 | 1.15 |
| 14 | 220 | 1.2 | 1.2 | 1.4 | 1.3 | 1.2 |
| 15 | 226 | 2.1 | 1.4 | 1.6 | 1.7 | 1.5 |
| 16 | 240 | 2.2 | 1.4 | 1.8 | 1.8 | 1.5 |
| 17 | 240 | 2.0 | 1.3 | 1.4 | 1.9 | 1.6 |
| 18 | 184 | 1.4 | 1.4 | 1.3 | 1.6 | 1.75 |
| 19 | 214 | 1.8 | 1.6 | 1.6 | 1.7 | 1.6 |
| 20 | 230 | 1.7 | 1.4 | 1.5 | 1.5 | 1.3 |
| AVERAGES | 220.1 | | | | 1.48 | 1.35 |